utrinque dente magno emarginato armatus. (Corp. long. ·7 unc.; lat. ·175 unc.)

The general colour gray; the antennæ stout, much compressed, brown with the exception of the two basal joints, which are gray; the head is gray, the eyes being large, round, distant, lateral, very shining, and of a darker colour than the crown of the head which has four tubercles, two nearly erect and rather acute, each situated about equi-distant from a median line and the margin of the eye; the other two are less prominent, directed forwards and situated between the first pair and the base of the antennæ. The prothorax is of a pale whitish ash-colour, the centre of the disk being darker and having a slender impressed black longitudinal line; the lateral margins are produced into a bifid porrected tooth, the anterior lobe of which is rather acute. The elytra have five ridges, one sutural, two dorsal, one lateral and one marginal: the marginal interstice has a triple row of deeply impressed punctures, the other interstices have a double row: the elytra are ash-coloured, with various brown shades, the ridges nearly white interrupted with dark brown.

Inhabits the Cape of Good Hope; a single specimen is in the cabinet of Mr. Melly.

XXXVI.—*On the Morphology of the Ascidia of Plants.* By M. Ch. Morren, Professor of Botany at Liège, Member of the Royal Academy of Brussels.

Without doubt there are few persons who have not admired, whilst passing through the hot-houses of our horticulturists, the singular structure of the ascidia of *Nepenthes*, *Sarracenia*, *Cephalotus*, *Marcgravia* and *Norantea*. The three first of these genera evidently have lids to their pitchers, which are formed at the expense of the foliaceous organs; but is the nature of these reservoirs of water properly viewed by morphologists? is it well understood? Many authors confine themselves to describing them, and few like Lindley, DeCandolle and Link have hazarded an opinion as to their origin. I have been fortunate enough to meet with two ascidia developed by

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a case of monstrosity upon two plants, the leaves of which generally offer no similarity at all; and the examination of these two vegetable monstrosities, which I would rather term simple anomalies, afford me an opportunity of putting forth some new ideas on the formation of the ascidia. In fact, the question is to know whether the ascidia are modifications of the petiole or whether they are derived from the blade of the leaf; whether they are petioles which are become hollow, or whether they are the blades of leaves cohering at their margins in the form of pitchers. Mr. Lindley thinks that they are hollow petioles, although he himself admits, whilst declaring this principle, that the ascidia are fistular bodies occupying the place and performing the functions of leaves.

The pitcher is the true petiole according to him, and the operculum which covers the hollow part is the blade of the leaf in an extraordinary state of transformation. This illustrious English botanist arrives at this idea by the analogy which he finds between the structure of the leaves of *Dionæa muscipula* and those of *Nepenthes* and *Sarracenia*, having found another between the three families, the *Sarraceniæ*, the *Droseraceæ*, and the *Nepentheæ*, to which these plants belong*. In the *Dionæa muscipula* he says, the leaf consists of a broad-winged petiole, articulated with a collapsing blade, the margins of which are pectinate and inflexed. Let us suppose, he continues, the broad-winged petiole to collapse also, and that its margins, when they meet, as they would in consequence of a collapsion, cohere; a fistular body would then be formed just like the pitcher of the *Sarracenia*; and in this case there will be no difficulty in identifying the acknowledged blade of the *Dionæa* with the operculum of *Sarracenia*. From *Sarracenia* the transition to *Nepenthes* would perhaps not be considered improbable†.

We see then that Mr. Lindley views the ascidia of *Nepenthes* and of *Sarracenia* as a deviation of form of a winged petiole, the upper surface of which is become the outer surface of the pitcher; the under surface of the petiolar blade would

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Dr. Lindley, however, with the skill which characterizes all his literary productions, adds, that it would be wrong to suppose that all pitchers are by nature petioles; he even figures *Dischidia Rafflesiana*, the leaves of which are evidently united at their margins to form the singular hollow organs of this plant. In *Marcgravia* and *Norantea* it is no longer the leaves, properly so called, which form the ascidia, but the bracts united likewise by their margins. In this last case it is the blade which constitutes the organ.

There would then be two systems of ascidia, *petiolar*, and lamellar or *limbar*, the latter formed by the cohesion of the margins of the blade, the former by the cohesion of the margins of the wings of a petiole. In none of these cases would it be a petiole hollowed in the interior and rendered fistular, being at the same time open; in like manner as the pedicels and the leaves of the garlics are, remaining closed. M. Alphonse DeCandolle also thinks that it is the petiole which unites together the two margins of its wings to form the ascidium in *Nepenthes* and in *Sarracenia**. This opinion was moreover conformable to the theory of M. DeCandolle, senior, who also regards the lid as the representative of the blade, and the pitcher as a dilatation of the petiole; but adds, that in the present state of the science, it will always be difficult to form a decided opinion with respect to this subject†. M. DeCandolle, senior, however mentions small cups formed at the expense of the tendrils in *Vicia*, and others which arose from the expansion of the medial nerve prolonged beyond the blade of the leaf in cabbages.

That which M. DeCandolle says of the *Vicia* naturally brings back the question to where it was left by Willdenow‡, who connects the pitchers to the ochreæ of *Polygoneæ*, to the spathes, to the ramenta, and to the stipules on one hand, and on the other hand to the aeriferous vesicles of the *Utricularieæ*, to the ligula, the involucra and other analogous organs. But this

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M. Link proposes quite a different system. He first lays down this principle, that the blade of a leaf is never developed after the petiole, but always before (nunquam lamina post petiolum, sed semper ante ipsum explicatur), which I shall take the liberty of denying; for if we observe the development of the leaves with large reniform blades of *Hydrocharis morsus-ranæ*, we shall see precisely the contrary; the petiole is first developed without a trace of blade and sometimes becomes more than a foot long, then at its free extremity it expands at first into two auricles which unite to form an oval; this grows larger and larger to elongate finally into a great kidney-shaped blade. There the subsequent origin of the blade is a thing quite evident. I have also observed it on *Sagittaria sagittifolia*, &c. M. Link however, setting out from this fact as from an incontestable principle, afterwards observes, that in *Nepenthes* the leaves have at first no ascidia which originate subsequently; and he further remarks, that the inferior leaves are without the ascidiferous petiole, which is only present on the upper leaves. He thus takes the lanceolate organ which terminates the lower part of the ascidiferous apparatus of *Nepenthes* for a true leaf, and the pitcher with its cirrhose support appears to him to be an appendix of the inflorescence, which is confirmed in his opinion by what happens in the bracts of *Norantea* (Ascium *). This idea of comparing the pitcher to a floral organ, of reducing its origin to a state of the flower, appears to me a first step towards the correct appreciation of the true nature of the ascidium. This is the state of the discussion between the principal English, French, and Prussian botanists who have treated of organography at the present period. I cannot agree with them, however great influence their authority may have upon my opinions. In the first place, there is a great difference between the ascidium of *Nepenthes* and those of *Sarracenia*. Upon *Nepenthes distillatoria* as upon *N. cristata*, two species which I have before me, the moveable lid is articulated and its system of nervation

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* Elementa Philosophiæ Botanicæ, 1837, vol. i. p. 474. § 115.

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differs from that of the pitcher. Upon the operculum there is a palmate nervation, on the pitcher a parallel nervation. Let us first examine *Nepenthes distillatoria*: the pitcher has three principal nerves, two in front and one behind, parallel, but diverging at the extremity of the inferior cirrhus; between these nerves there are other smaller ones parallel with these and with each other. The operculum ends at the posterior nerve, and bears two nerves which terminate angularly at its base and then radiate like two fingers of the hand. Now this posterior nerve of the pitcher is the elongation of the ascidiferous cirrhus which is the elongation of the medial nerve of the inferior foliaceous organ. And moreover, upon *Nepenthes cristata*, each of the two front nerves bears a ridge which evidently represents the two margins of a foliaceous blade cohering so as to form a pitcher.

In fact, the pitcher is in my opinion a true blade, and the inferior foliaceous organ is a winged petiole. Let us first recollect that in the phyllodia a compound leaf may unite its leaflets into one body, and that it is not unusual to meet with these halves, quarters, and fifths of these phyllodia, bodies simple at the lower part, leaves compound superiorly, and there bearing a smaller or larger number of leaflets, even from a single leaflet up to a great number. The phyllodia are perpendicular to the direction of the common plane of all the leaflets in a state of waking, and the plane of the phyllodium is in the same direction as the leaflets which are dormant; as if the cohesion having taken place in their youth, the leaflets had the situation of sleeping organs (the sense in which I use this word sleeping (*endormi*) here is known.). But these directions, respectively perpendicular the one to the other, are not indispensable when the leaflets of a compound leaf cohere with one another to form the appearance of a simple leaf. I have before me, at this moment, a *Schinus Molle* raised from seed, in which the young leaves present their leaflets cohering side by side and occupying the same plane as a simple leaf, that is to say, the direction parallel with the horizon. I have in the Museum of Vegetable Anatomy at Liège, a decidedly compound leaf of *Epimedium macranthum*, where there is a similar cohesion of the leaflets, side to side. I suppose now that

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all the leaflets of an impari-pinnate leaf cohere with the exception of the odd one, a thing which is very possible; this condition, with a winged petiole, will represent the first morphological phase of *Nepenthes*, where the operculum will be the free leaflet. Mr. Lindley supposed that the wing of *Dionæa* was folded back to cohere, so that the upper had become the outer surface of the pitcher of *Nepenthes*. This appears to me contrary to all analogy. I said above that I possessed two monstrous ascidia. One is on *Vinca rosea*, the other on a *Polygonatum multiflorum*. Now, upon these two ascidia, it is the blade which has cohered and not the petiole which is become hollow, and the cohesion has taken place in such a manner that the under surface of the blade is become the outer of the pitcher and the upper the inner surface. The pitcher of *Polygonatum* resembles that of a *Sarracenia* so closely that it might be easily mistaken for it.

This mode of cohesion and this direction of the folding were all to be foreseen. Wolff, Goethe, DeCandolle, and Turpin have all proved by the unitarian theory of morphology, that for a carpel to be produced, the leaf, the generating element of all the appendicular organs, is not differently circumstanced, that it coheres above and not below; and thence arises that the ovules are produced by the secreting surface of the leaf, the upper surface, while the stomata are on the outside of the ovarium, and while the absorption is carried on by this same outer surface. The same philosophic mode of reasoning has proved the anther also to be the blade of a leaf cohering above and producing (this antherian leaf) by its secreting surface (or surface of production, which is one and the same thing) the pollen, as upon several anthers there are stomata on the under surface, that is to say, on the outer surface of the leaf which produced them.

It is on this account that Link's idea of the ascidium o *Nepenthes* being a floriform organ, appeared to me fruitful in consequences, although they seem as yet to have struck no one.

From the manner of thinking above expressed it will now be perceived that the functions of the ascidia are quite naturally explained, and as simple deductions from a well-established fact. Indeed up to the half of the pitcher it exhibits

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its surface inwardly covered with those glands, so well described by M. Meyen in his excellent memoir on the glandular system of vegetables*, glands which, according to the observations of Turner, secrete a liquid, which by ebullition acquires a smell of baked apples and deposits crystals of the super-oxalate of potash †. These glands evidently represent the ovules of the carpels, the pollen of the anther, the nectariform fluid of the ascidimorphous bracts of *Norantea* and of *Marcgravia*, that is to say in one word, the secretions of the upper surface of the leaf, the typical organ. Upon the operculum of the pitcher in *Nepenthes cristata*, on that surface which faces the cavity of the pitcher, there are similar glands. Now this is the upper surface of the leaflet which constitutes the operculum.

The outer surface of the pitcher is then in our opinion the under part of the leaf which has formed the ascidium. We also find upon it the stomata which abound on the corresponding surface of the leaves. Upon *Nepenthes distillatoria* the lower surface of the winged petiole offers the same dull aspect as the outer surface of the urn, and within this, upon a dry specimen, gathered in the Edinburgh Botanic Garden, I perceive in the zone above the glandular region a waxy velvet, of a varying violet colour, like the bloom which covers grapes and plums, globules of wax which hinder the urn from becoming wet within, and which moreover, favouring my system, indicate the existence of a glandular excretion.

In the same manner, upon the ascidium of *Polygonatum* the inner surface was covered with a gum, like the upper surface of the leaves of this plant, and its outer superficies dull like the under surface of the leaves.

Lastly I will add, that upon *Nepenthes cristata* the crests which imitate the two margins of the ascidimorphous leaf are pectinated with flattened and stiff hairs, like the blade of *Dionæa muscipula*.

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purpurea, rubra, variolaris and *flava,* which I have particularly examined, there is everywhere a prominent crest which imitates a phyllodium perfectly; it is very decided upon *Sarracenia purpurea* and *variolaris*; then come the *rubra* and the *flava,* where it is least developed. Upon the *variolaris,* at the aperture of the urn, on the side opposite to the opercular lamella, we see that the crest is formed of two cohering blades, which diverge or separate to form the urn. Moreover there is upon the urn, on the side opposite to the crest, a principal nerve which evidently represents the medial nerve of the blade of the leaf; the crest is merely the junction of the margins of the blade, and the urn is the cavity which results from this cohesion. It is here a simple leaf of which the two lateral portions of the blade are conjoint. This seems to me to be so true that the accidental ascidium of *Polygonatum* offered the greatest affinities with the permanent ascidium of *Sarracenia rubra,* only that the crest and the struma were not present, but the opercular lamella presented equally the same form and the same arrangement. This opercular lamella is not articulated as in *Nepenthes,* and does not differ in the system of neuration from the rest of the apparatus; it represents then simply the extremity of the ascidimorphous leaf, the margins of which extremity do not cohere. Upon the accidental ascidium of *Vinca rosea* the operculiform lamella was much larger in proportion to the size of the hollow cavity.

When we examine the origin of the ascidium of *Sarracenia purpurea* we see that it is the crest which first forms and grows quickly; towards its principal nerve there is a cylindrical hollow tube which is subsequently developed into a pitcher. This tube is at first closed by the circinate disposition of its extremity, and in this species two small lateral lamellæ separate to form the opening of the pitcher. These two lamellæ become in the *purpurea* the two lips which serve as an operculum to shut the pitcher like two lateral valves. Their junction, instead of being elongated into an opercular blade as in the other species mentioned, is on the contrary grooved. There is here an organic compensation; the substance of the

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lips has carried away that of the blade. Thus *Sarracenia flava* represents the intermediate state; there is a blade and the lips, each half developed. *Sarracenia variolaris* has small lips and a larger blade, and *Sarracenia rubra* has a large blade without any lip. Moreover the same antagonism exists between the struma and the lips; in *Sarracenia purpurea* a struma which occupies but the third of the aperture of the pitcher, and great lips; in *Sarracenia variolaris* a semi-struma and small lips, and in *Sarracenia rubra* a struma almost circular without lips. The *Sarracenia flava* deviates somewhat from this law.

From all these considerations it appears to me, 1st, that since all the ascidimorphous bracts of *Norantea* and of *Marcgravia* are the blades of bracteal leaves joined at their margins so as to form hollow pitchers; 2nd, that since the *Dischidia Rafflesiana* evidently presents leaves with the blade cohering to form an ascidium; 3rd, that since in monstrous states we see blades of leaves become ascidia, and that petioles are not hollowed to produce this form accidentally, and that when they are winged we do not see their wings cohere at their free margins; 4th, that since the structure of *Sarracenia* proves very decidedly that it is a leaf which forms the ascidium, retaining the apex of the blade in its non-coherent state; 5th, that since the ascidia of *Nepenthes* have already at the lower part a winged petiole, and that the crests of their pitcher are traces of foliaceous blades;—it must be allowed that the ascidia have, wherever they have been observed hitherto, a similar organic composition, and that all are metamorphoses of the leaf and particularly of the blade of this organ.

It must be admitted that to give rise to this production nature has folded in the blade of the leaf above, by uniting its margins so that the upper surface of the organ becomes the inner side of the pitcher; that thus there is a great analogy between a carpel and an ascidium, that this is invested with a floral condition, that it has advanced a step further in organization,—but that with all these changes the functions remain the same, because the anatomy of the organs has not been affected, and that thus it was necessary that the ascidium should secrete a fluid in its cavity; as the nectary, another united or

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modified leaf, secretes nectar; as the anther, also a united leaf, forms the pollen; as the carpel, also a united leaf, produces ovules: and thus it is that a well-understood law, the unity of organic composition, explains phenomena about which there was only disagreement, uncertainty and error.

XXXVII.—*Floræ Insularum Novæ Zelandiæ Precursor; or a Specimen of the Botany of the Islands of New Zealand.* By Allan Cunningham, Esq.

[Continued from p. 250.]

CORIARIEÆ, *DC.*

1. Coriaria, *Niss.*, *Linn.*

581. *C. sarmentosa. Forst. Prodr. n.* 377. *D.C. Prodr.* i. *p.* 739. *A. Rich. Fl. Nov. Zel. p.* 364. *Bot. Mag.* 2470.

Tupakihi ab incolis dicitur. *Wine berry shrub* of the Missionaries.

New Zealand (Northern Island).—1769, *Sir Jos. Banks.* Abundant on the hills around the Bay of Islands, Wangaroa, &c.—1826, *A. Cunningham.* (Middle Island.)—1773, *G. Forster.*

Frutex dumosus, diffusus, procumbens, ramis elongatis, glabris. *Folia* cordato-ovata, acuminata, integerrima, glabra, 5-nervia, breviter petiolata. *Racemus* axillaris, elongatus, pendulus, folio multo longior. *Flores masculi*: numerosi, breviter pedicellati, pedicellis basi bracteatis. *Calyx* 5-fidus, laciniis obtusis. *Petala* nulla, glandulæ 5 segmentis calycis alternæ. *Filamenta staminum* filiformia. *Antheræ* purpuræ 2-loculares. *Flores fœminei*: *Calyx et glandulæ* uti in masculis, etiam absque petalis. *Stamina* 10 effœta. *Ovaria* 5. *Stigmata* 5 patentia. *Carpella* 5, cohærentia (ad maturitatem subdiscreta approximata) monosperma, glandulis grandifactis cincta.

The expressed juice of the fruit of this shrub, which is a berry, is very palateable, and is drunk by the natives or used with their fern root, which, when baked, is soaked in it. The Missionaries also make a wine (*Tuta*) from the fruit, which, in flavour, bears great resemblance to that usually prepared in England from the berries of the elder. As the natives are well aware that a highly poisonous property resides in the seeds, they are careful to strain the juice of them; for if they are eaten in any quantity, violent convulsions and delirium have been brought on, and sometimes even death has been known to ensue. M. DeCandolle tells us, that by eating the fruit of another species (*C. myrtifolia*), several soldiers of the French army in Catalonia were affected, of whom fifteen were stupified and three died.

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